2000 Annual Report of the Advanced Technology Program Advisory Committee

U.S. DEPARTMENT OF COMMERCE
TECHNOLOGY ADMINISTRATION
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ADVANCED TECHNOLOGY PROGRAM

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Members of the Advanced Technology Program Advisory Committee

(Left to right: Dr. Howard Frank, Dr. Joseph Lichtenhan, Ms. Marsha Schachtel, Mr. John Yochelson, Prof. Shane Greenstein, Dr. Lewis Edelheit, Dr. Arden Bement, Jr., and Dr. Thomas Theis)

Dr. Arden Bement, Jr. (Chair)
Basil S. Turner Distinguished Professor of Engineering
Purdue University
West Lafayette, IN
(*Term expires 12/31/2002*)

Dr. Lewis S. (Lonnie) Edelheit
Senior Vice President
General Electric Company
Niskayuna, NY
(*Term expires 12/31/2000*)

Dr. Howard Frank
Dean
Robert H. Smith School of Business
University of Maryland
College Park, MD
(*Term expires 12/31/2002*)

Professor Shane Mitchell Greenstein
Management and Strategy Department
Kellogg Graduate School of Management
Evanston, IL
(*Term expires 12/31/2001*)

Dr. Joseph D. Lichtenhan
President
Hybrid Plastics
Mountain Valley, CA
(*Term expires 12/31/2001*)

Ms. Marsha R. B. Schachtel
Senior Fellow, Institute for Policy Studies
Johns Hopkins University
Baltimore, MD
(*Term expires 12/31/2002*)

Dr. Thomas N. Theis
Director, Physical Sciences
IBM
Thomas J. Watson Research Center
Yorktown Heights, NY
(*Term expires 12/31/2000*)

Mr. John Yochelson
President
Council on Competitiveness
Washington, D.C.
(*Term expires 12/31/2001*)

I. INTRODUCTION

The ATP Advisory Committee is currently comprised of eight members—prestigious individuals from industry, academia, and non-profit organizations with an interest in and knowledge of issues related to advanced technology and economic development. Its charter can be found on the ATP website at: www.atp.nist.gov.

The Committee acts in the public interest to:

- Provide advice on ATP programs, plans, and policies.
- Review and critique ATP evaluation efforts.
- Assess the degree of success of the ATP in achieving its legislatively mandated mission.
- Function solely as an advisory body, in accordance with the provisions of the Federal Advisory Committee Act.

The Committee met three times during 2000 (February 2, May 16, and October 17). (This is the first year of the Committee's existence.) Each meeting consisted of public sessions during which ATP personnel briefed us on plans, accomplishments, concerns, and issues. We also heard updates from Charles Wessner of the National Academy of Sciences/National Research Council (NAS/NRC) regarding a study of the ATP carried out by NRC. The meetings also included brief closed sessions during which we could hear about budget and personnel issues and during which the Committee discussed its views and formulated its recommendations. Following each meeting, minutes were prepared and posted on the ATP website. At the conclusion of each meeting we provided feedback and advice to ATP and NIST management.

We have found these meetings to be intellectually stimulating and have found NIST and ATP to be receptive to advice. The section that follows documents the Committee's findings and recommendations for the year 2000.

II. FINDINGS AND RECOMMENDATIONS

FINDING 1: The ATP is a well-run program, characterized by objectiveness and fairness to applicants.

We have been impressed with the professionalism and integrity of the ATP management and staff. It is clear that the civil servants who work for ATP have, from the beginning, made sure that all awards are merit-based and that each applicant is treated fairly. The ATP staff members have a strong work ethic and seem dedicated to continuous improvement. Were we to assign a "grade" to ATP's operations, it would be an "A." NIST has a long-standing reputation for doing things right, and this has carried over into the culture of ATP.

Congress made a wise decision by assigning responsibility for this program to NIST. ATP can call upon the wide variety of technical expertise in the NIST laboratories to supplement its own competent staff. And, in cases where other Federal agencies have special expertise, ATP has been successful in recruiting their top experts to assist. (For example, representatives of the Human Genome Project at NIH worked with the selection boards for the ATP program in DNA diagnostics.) Because of the availability of this broad technical expertise, ATP's technical judgments are sound. Furthermore, ATP has been successful in recruiting knowledgeable people in the business and economic areas to serve on selection boards and serve as business reviewers, including even retired corporate executives; hence ATP is fully capable of assessing business issues associated with proposal evaluation. (Critics of ATP who argue that "government bureaucrats are not qualified to assess business issues" have obviously not taken the time to understand how ATP actually operates.)

Geographic location does not enter into the ATP selection criteria. However, ATP's computer databases do permit one to examine the distribution of awardees to date. We noted that the geographic distribution of ATP awards closely parallels that of other science and technology agencies such as NSF and NIH. There are some States that have relatively few high-tech companies within their borders. Consequently, ATP receives very few proposals from those States and therefore has made few or in some cases no awards. However, ATP, to its credit, has stepped up its outreach to under-represented States to ensure that companies in those States that might wish to participate in ATP are aware of the opportunity. Unlike some other Federal programs, ATP does not have set-asides for women- or minority-owned businesses. Again, to its credit, ATP has been reaching out to under-represented groups, e.g., Historically Black Colleges and Universities, to ensure that they are aware of opportunities for participating in ATP projects and to encourage them to look for opportunities to team with companies applying for ATP awards.

A new ATP Director, Alan Balutis, was named this year. There have been several other changes in ATP management during the past 18 months. We believe the current ATP management team is highly competent and working well together.

FINDING 2: The Committee believes that the ATP is accomplishing its goal of stimulating economic growth through the acceleration of new technology.

The ATP has sponsored a number of in-depth economic studies that show significant economic benefits to the Nation from completed projects. (See Finding 4 and Appendix 1.) As would be expected with high-risk, long-term, cutting edge research projects, not every project cost-shared by ATP has been a success. Some have experienced insurmountable technical problems, and some, business difficulties. But a significant number of projects funded by ATP have been outstanding successes—real home runs. Quite a few projects show intermediate results in delivering benefits, but such projects can still have a net positive impact for the Nation without being home runs. Of course there is uncertainty in individual project estimates of

benefits since such estimates are difficult to carry out. Benefits are typically diffuse and continue well into the future, which makes quantification daunting. Nevertheless, when the entire portfolio of completed projects is examined, the net benefits of the highly successful projects are sufficiently large that any uncertainty in individual estimates would not alter the bottom-line conclusion—that it is increasingly clear that ATP is delivering on its promise to contribute to economic growth by bringing new technology on stream considerably faster. We on this committee are confident that the benefits to the Nation from the ATP greatly exceed the cost to the taxpayers. The preliminary results of the NRC study also seem to bear out this conclusion.

FINDING 3: While ATP's mission has evolved somewhat, there are compelling reasons for the Nation to continue to include a program like ATP in its R&D portfolio. It addresses an otherwise unmet need for Federal support.

The mission of the ATP has evolved somewhat since it began more than a decade ago. In the late 1980s, concerns were frequently voiced about job creation in high-tech industries and loss of markets for sophisticated products to overseas firms. Today unemployment in the technology sector is low, and U.S. high-tech firms are, for the most part, doing well in the world economy. ATP cannot take credit for *all* of this progress, but the Committee *is* convinced that ATP has definitely had a positive measurable impact on the current state of U.S. technological prowess. The economic assessment activities of ATP are producing an increasing body of credible evidence that the program is accomplishing its goal of fostering technology development in the United States, and that the benefits to the Nation greatly exceed the cost of the program.

When ATP funds projects in a new area of industrial/private-sector R&D that has received little private-sector funding, and when successes become known, this can trigger a much larger commitment of private-sector funds; hence ATP has considerable leverage in such situations. This was certainly the case in DNA diagnostics and DNA analysis chips. When ATP began to fund this area some years ago, it was viewed by many as bordering on science fiction. Today new companies are springing up to exploit this new technology, and people are predicting that DNA diagnostics chips will before long be commonplace in clinics, doctors offices, forensics laboratories, and elsewhere. We believe ATP served as a "new industry incubator" for this emerging industrial sector.

Whereas in the 1980s, the United States tended to worry about competition in high-tech industries primarily from Japan, and to a lesser extent, Germany, today countries such as Finland, Taiwan, India, China, and Singapore are aggressively pursuing technology development as the primary way to foster economic growth, and these efforts are paying off. If the United States rests on its laurels in any technology area, other countries will be eager and ready to pass it by.

A vocal few have argued that it is inappropriate for the Federal government to support ATP in its present form, and that if ATP is to exist at all, it should be limited to co-funding only those projects that would not have been done at all without ATP. While there are a considerable number of ATP projects that are in that category—they would not have been done at all without ATP—a more common situation is that ATP greatly *accelerates* the development of new technology that will benefit the United States. Such projects might have proceeded without ATP co-funding, but would have been carried out at a much slower pace, hence the economic and other benefits would have occurred much later in time. Federal Reserve Chairman Alan Greenspan has attributed our economy's ability in recent years to grow rapidly without suffering from inflation to the fact that new technology in areas such as computers and the Internet have increased productivity. By helping to maintain the rapid pace of technology development in the United States, the ATP contributes to a strong economy.

In the health care area, ATP is co-funding a large number of projects that could ultimately lead to cures or more effective treatments for a variety of serious diseases and common ailments. Examples include

xenotransplantation research projects that could make organ transplants simpler, less risky, more readily available, and less costly; projects that could lead to effective treatments for diseases such as diabetes and Parkinson's Disease, and even a recent project to develop new and better ways of making dental crowns using digital imaging. Not every ATP project will succeed, but certainly some will (many already have), and the benefits to patient quality of life can be significant above and beyond the economic benefits. Similarly, other projects could lead to much more efficient manufacturing processes for a variety of widely used products, lowering prices to the consumer. The ATP website provides examples of successful projects.

Today there is more venture capital available than in past years, but venture capitalists typically look for investments that will pay off in three years or less. ATP funds much longer-term projects. The Director of the National Venture Capital Association has gone on record as saying that ATP complements what venture capitalists do; it does *not* duplicate what they do. He said, "…as research dollars on the company and university levels become more scarce, Federal programs such as the ATP become more important." Granted, there is plenty of funding available today for new dot-com startups, but those companies are not doing long-term R&D, and that is what ATP supports.

In light of these facts, we believe that ATP has a unique role in the Nation's R&D posture. NIH funds basic research at universities in health topics, but traditionally has not emphasized working with industry to translate newly discovered concepts into better treatments and medical products. DARPA funds advanced technology for military applications and sometimes for dual-use applications, but it does not have a mandate to support civilian technology. NSF funds basic research at universities, but like NIH, does not emphasize working with industry to bridge the gap between basic research and new industries. NASA funds R&D associated with its space and aviation mission, but not in other areas. DOE funds basic and applied research in energy-related technologies that help industry and society. Thus, ATP is bridging a gap that would not otherwise be bridged by other Federal agencies and is helping to keep the United States in the forefront of new technology areas. However, ATP's budget is miniscule compared to NIH, NSF, or DARPA.

FINDING 4: ATP has created a model program for economic impact assessment. Other Federal agencies would do well to engage in extensive self-evaluation as ATP has.

ATP's Economic Assessment Office (EAO) has the challenging job of measuring the impact of the long-term R&D projects supported by ATP. The nature of the projects co-funded by ATP are such that the benefits, while potentially great, are diffuse (by design, for broadest impact), and tend to occur several years after ATP funding has ended. Thus, the problem of tracking results is daunting. Nevertheless, ATP has done a truly professional job of tackling this challenge. No other Federal agency that we are aware of has done such a comprehensive job of self-assessment—not just assessment of successful projects, but a process to assess *all* projects during the R&D phase and beyond.

Within the technology policy and economics communities there is widespread interest in studying ATP's assessment methods. The NRC has investigated programs in other countries designed to foster technology development, and has found keen interest around the world in learning how ATP does its assessments. Members of the ATP EAO staff have been invited speakers at international conferences. The NRC's Charles Wessner said that the ATP's self-assessment program is "far superior to anything elsewhere in the Federal government." In this regard, ATP is to be commended for having broken new ground. Long before GPRA was passed (the Government Performance and Results Act), ATP was gathering data to quantify the impact of its projects. Wessner also commented to the Committee that ATP "may have been too honest" in that ATP discusses openly its failures as well as its successes, whereas most agencies only tout their successes.

ATP has formed an alliance with the National Bureau of Economic Research. (NBER is to the economics community what the National Academy of Sciences is to the science and technology community.) This relationship has made it possible for ATP to entice some of the country's most prestigious economists to investigate and critique ATP's methods and data.

We recommend that those who wish to understand the ATP and what it is accomplishing read the plethora of reports generated by the EAO. Appendix 1 lists recent publications. Check the ATP website for a more complete listing.

FINDING 5: Recent changes made by ATP are improving an already good program.

ATP recently announced that it will henceforth accept applications year-round rather than in one competition per year. Once a given application is determined to meet ATP's high standards of technical and business merit, it will be recommended for funding. (Applicants whose proposals score insufficiently high on the ATP selection criteria can receive a thorough and prompt debriefing to inform them of the strengths and weaknesses of their proposals.) We applaud this change which will mean that applicants with promising ideas will not have to wait a year or part of a year for the next window of opportunity. This change will also have the additional benefit of spreading ATP's workload more uniformly throughout the year. ATP has also simplified its application kit and is moving in the direction of electronic submissions.

ATP is reaching out to under-represented States and to minority institutions. They are strengthening ties to State governments and to other Federal agencies. These are all positive steps that deserve commendation.

RECOMMENDATION 1. ATP should continue to seek opportunities to work more closely with State governments.

We see clear evidence that ATP is stepping up its efforts in this regard, and we encourage the continuation of these efforts. Today a number of State governments have active programs to promote technology development. By working with such programs, ATP can have greater leverage and reach a greater number of interested companies.

RECOMMENDATION 2. ATP should explore ways of increasing synergism in particularly promising areas of technology.

It is clear that ATP can have a major impact when it funds a cluster of related projects in a promising area of technology. The best example of this is DNA diagnostics. When ATP first began to fund projects to develop DNA analysis chips, this was an embryonic industry, with a myriad of difficult technical problems to solve, such that the risk of failure seemed high and hence the opportunities were not at all obvious to potential investors. After ATP funded some early projects in this field and impressive results began to emerge, the industry began to take off, and today this biotech field is an exciting new high-growth activity. Without ATP co-funding, DNA diagnostics chips would probably eventually have been developed, but likely several years later than with ATP funding.

ATP had to discontinue focused program competitions some years ago due to insufficient funds to support the substantial number of exciting program ideas submitted by industry. Focused programs had come under scrutiny from a small number of members of Congress who were philosophically opposed to the concept. The publicly stated reason does not make sense to this Committee—that it is inappropriate for the Federal government "to pick winners and losers" and that only industry was capable of making such judgments. This argument shows a lack of understanding of how ATP actually operates. ATP did not arbitrarily pick focused program areas. In every case, the areas that were pursued were areas that *industry* had proposed—ones that industry believed had potential, but were not receiving adequate support either from private sources or government sources because of high technical risks. Our perception is that industry leaders and industry scientists and engineers were generally very supportive of focused program competitions.

We also note that there are areas of technology that could be extremely important to the country but that industry is unlikely to pursue aggressively on its own.

In any case, the Committee believes that ATP should explore new ways of achieving synergism in closely related projects in promising technical areas.

RECOMMENDATION 3. ATP should *not* be restricted to small businesses.

Some have suggested that ATP should be restricted to co-funding small businesses. The Committee believes that the current mode of allowing businesses of all sizes to participate in ATP as well as allowing universities to participate as joint venture partners or subcontractors is appropriate. ATP is not the same as the SBIR Program (Small Business Innovation Research Program). SBIR's selection criteria are different, and ATP's ability to support joint ventures involving companies of all sizes is important for broader diffusion of results.

Furthermore, there are R&D projects conceived in large companies that have considerable promise for benefits to the Nation, but do not get supported because the technical risks are sufficiently high that the envisioned return on investment to the firm is too small or too far out in time. Corporations today are emphasizing shorter-term R&D and product development. The days of the former Bell Labs sponsoring long-term research are over. However, a trend in industrial R&D today is for large companies increasingly to team with tiers of small business suppliers or end-users. Such alliances with small businesses show up in many ATP joint venture projects. It is common in ATP joint ventures for a large business to lead a joint venture involving a number of small companies where the bulk of the ATP funding goes to the small firms rather than to the large firm leading the venture. We believe it is in the national interest to encourage these kinds of partnerships.

While the Committee supports the idea of maintaining a requirement for a larger cost share on the part of single applicant large businesses, we would strongly oppose having the ATP restricted to small businesses. There are important technical problems the solution of which can only be undertaken by large corporations because of the special skills and knowledge required and/or because smaller companies would not have the resources to commercialize the expensive new technology if and when the ATP project is successful in solving the technical problems.

RECOMMENDATION 4: Certain legislative changes would strengthen the ATP.

The original ATP legislation was crafted in the 1980s. The maximum amount of ATP cost sharing for a single applicant was capped at $2 million, and that figure has not changed in more than a decade. The Committee believes that the figure needs to be increased to the equivalent of whatever the $2 million in 1988 would correspond to in today's dollars, and that the amount should be indexed to inflation in the future.

In recent years, Congress has put a number of restrictions on the ATP budget, specifying each year, for example, how much can be spent for new awards, for continuation of ongoing projects, and how much can be spent on administration. This micro-management often causes difficulties for ATP and seems to us unnecessary. Congress should hold ATP responsible for accomplishments under the Government Performance and Results Act, but should not seek to manage the program.

The current ATP legislation restricts how intellectual property can be shared with universities participating in joint ventures. The Bayh-Dole Act, which allows universities to retain intellectual property rights for research performed with Federal funds, does not apply to ATP. The Committee recommends that the ATP authorizing legislation be rewritten such that companies applying to ATP can decide for themselves how they wish to share intellectual property ownership with university partners if and when they do wish to share it. This change would be welcomed by universities throughout the United States and would likely increase university participation in ATP projects.

III. ACTIVITIES AND EVENTS

ATP Technology Showcase

On April 5, 2000, ATP sponsored a "technology showcase" on Capitol Hill. A number of ATP awardees presented the results of their projects. Members of Congress spoke. Such events help decision-makers better understand the ATP. John Yochelson of the Advisory Committee represented this Committee at the event. It would be appropriate for ATP to hold more such events in the future. We suspect there are many members of Congress and congressional staffers who do not understand the program very well. With a new Congress about to be sworn in, it is important to communicate effectively with the new members.

Coordination with the NIST Visiting Committee on Advanced Technology (VCAT)

The VCAT is responsible for advising NIST as a whole regarding its policies and operations so as to maximize the impact of NIST. While it, too, receives reports on ATP along with reports from other NIST operating units, it examines NIST as a whole and does not get into the level of detail about ATP that the ATP Advisory Committee does. Still, it is important that these two bodies cooperate and communicate well. During the past year, the VCAT and the ATP Advisory Committee explored ways to ensure good coordination. The Chair of the VCAT, Thomas Manuel, attended the October 2000 Advisory Committee meeting and has discussed with the Advisory Committee Chair ways to improve communications between the two bodies. This is a healthy dialogue, and we intend to continue it in 2001.

NRC Study

As noted earlier, the NRC is currently carrying out a study of ATP that was Congressionally mandated. NRC is also studying other government-industry partnerships including the SBIR Program (Small Business Innovation Research) and programs involving NASA and DOE, and thus is in a good position to compare and contrast ATP with other Federal R&D programs. Several workshops to study ATP issues have been held at the NAS/NRC. Consistent with NAS/NRC's tradition for even-handedness, these workshops have included speakers praising ATP as well as critics of ATP. We look forward to reading this important objective report. We urge those with an interest in technology policy in general and in ATP in particular to study the report when it becomes available later this year. Charles Wessner of the NAS/NRC has updated this Committee during the past year on the progress of the study, and we appreciate his sharing his observations with us.

FY 2000 Competition

ATP completed another round of competition during fiscal year 2000. Detailed information on the awardees and competition statistics can be found on the ATP website. Fifty-four awards were made this year, the maximum that could be accommodated with the funds available. There were 15 joint ventures and 39 single applicants. Small businesses did very well in the 2000 Competition. Historically, over half of ATP awards (single applicant awards and joint venture awards) have been led by small businesses. In the 2000 Competition, the figure was over 75%.

Appendix 2 is a listing of this year's awards.

Appendix 1:
Economic Evaluation Reports for the Advanced Technology Program September 1999-November 2000

1. Maryann P. Feldman, Maryellen R. Kelley, Joshua Schaff, and Gabriel Farkas, *Reinforcing Interactions Between the ATP and State Technology Programs (vol. 2), Case Studies of Technology Pioneering Start-Up Companies and Their Use of State and Federal Programs*, November 2000, NISTIR 6523. This report describes the evolution of four ATP funded technology companies, with emphasis on the nature of the State and Federal government support received by these companies. The four case studies illustrate that public resources have played a critical role in the growth of these companies and that State and Federal government resources complement one another. The ATP played an important role in supporting early stage R&D in each of these cases, while the State programs provided capital and assistance in their business development. All four of the technology pioneers also drew on public (State) universities.

2. David Austin and Molly Macauley, *Estimating Future Consumer Benefits from ATP-Funded Innovation: The Case of Digital Data Storage*, April 2000, NIST GCR 00-790. Utilizing a quality-adjusted cost index to estimate expected returns on investments in new technologies, this report develops an economic model to evaluate the R&D investment decision. The study forecasts consumer benefit gains from two innovations in digital data storage funded in part by ATP: one innovation pioneers the use of optical tape; the other replaces helical with linear scanning of magnetic tape. The estimated consumer benefit gain for the optical tape technology exceeds $1 billion, and for the linear scanning technology, $2 billion.

3. Marsha R.B. Schachtel and Maryanne P. Feldman, *Reinforcing Interactions Between the Advanced Technology Program and State Technology Programs, A Guide to State Business Assistance Programs for New Technology Creation and Commercialization* (Vol. 1), April 2000, NIST GCR 00-78. Prepared as a resource for applicants to and award recipients of ATP, this guide aims to assist companies in becoming familiar with the types of resources available in their own States to help grow their companies, develop their technologies, produce new products and services, and continuously improve growing their businesses. The guide is divided into chapters that sequentially address the challenges a company faces in conceptual, developmental, and commercial phases of bringing a new technology to market, respectively. Each chapter describes the programs offered by the States and their partner organizations to address the challenge for that particular phase, selective examples of States that provide the type of assistance under discussion, and comments about how ATP can meet particular challenges.

4. Lewis M. Branscomb, Kenneth P. Morse, and Michael J. Roberts, *Managing Technical Risk, Understanding Private Sector Decisionmaking on Early Stage Technology-Based Projects*, NIST GCR 00-787. This study aims to portray the decisionmaking process that firms and outside financing sources undergo in the funding of early-stage, high-risk technology projects. The report is the result of a joint Harvard-MIT Project on Managing Technical Risk conducted under the sponsorship of the ATP. The report combines the results of the two workshops on the management of techical risk, and integrates comments from academic experts and experienced practitioners who were workshop particpants into the discussion, insights from the commissioned papers (included in full in the second section of the report), and referencs to related empirical and theoretical literature.

5. Jeanne W. Powell and Karen Lellock, *Development, Commercialization, and Diffusion of Enabling Technologies: Progress Report*, April 2000, NISTIR 6491. Using data collected through ATP's Business Reporting System (BRS), this study presents a statistical picture of progress in early 1998 as reported by 539 organizations that received awards from ATP from 1993 through 1997. The

report examines reporting companies' plans for commercialization for evidence of opportunities for economic spillovers and national economic benefit. It also provides indicators of ATP's effect in accelerating R&D, stimulating collaborations, and increasing private-sector investment in high-risk technology development, and documents progress of ATP-funded technologies during the award period. Although substantial commercialization results from ATP funded projects usually take a number of years after ATP funding ends, the study finds that considerable business planning activity is underway, and many companies report achievement of early commercialization milestones.

6. Jenny C. Servo, *Advanced Technology Program's Commercialization and Business Planning Guide for the Post-Award Period*, June 2000, NIST GCR 99-779. This guide aims to assist ATP awardees in deepening and refining their business plans, and aid them in presenting their newly gained opportunities to investors. The guide is a combination of text and workbook with one objective: to increase the likelihood of commercialization success by companies that receive funding through ATP. Organized in three sections, section one provides a cognitive framework for commercialization issues; section two is a tutorial on how to make a winning presentation to equity investors and strategic allies; and section three is a workbook of activities designed to sharpen business skills.

7. Bettijoyce Lide and Richard N. Spivack, *Advanced Technology Program: Information Infrastructure for Healthcare Focused Program: A Brief History*, February 2000, NISTIR 6477. By recounting the genesis of ATP's Information Infrastructure for Healthcare (IIH) focused program, this paper illustrates how a bottom-up model of a civilian technology program works. The ATP has held both general competitions, open to all technologies, and focused program competitions, in which a suite of projects was funded to address a particular problem. The IIH program began with an initial exchange of ideas among members of both private and public sectors, workshops conducted by ATP, and meetings held between both groups to identify the technologies necessary for the development of a national information infrastructure in healthcare.

8. Paul Gompers and Josh Lerner, *Capital Formation and Investment in Venture Markets: Implications for the Advanced Technology Program* (Harvard Business School and National Bureau of Economic Research), December 1999, GCR 99-784. This study examines the financing of small innovative firms by venture capitalists and angel investors, and focuses on the special problems of new high-tech firms that are highly dependent on external sources for funding their R&D. Drawing on several data sources, the authors report on patterns and trends in venture capital funding. They also report, in case study form, interviews with managers at seven small start-up companies in the Boston area that had received an ATP award. Presented as case studies, the interviews identify the role played by ATP in the R&D activities of the companies; determine whether company needs were addressed by private venture capital alone; and examine the interactions between venture financing and public initiatives in assisting these firms.

9. Jeanne Powell, *Business Planning and Progress of Small Business Firms Engaged in Technology Development through the Advanced Technology Program*, October 1999, NISTIR 6375. Focusing on the performance of small firms (those with fewer than 500 employees) compared to medium-to-large firms (grouped together and defined as 500 or more employees), this report assesses participation, strategies, and progress of firms engaged in technology development through partnership with ATP. Utilizing 1997 data collected from ATP's Business Reporting System from firms receiving ATP awards from 1993-1996, the report identifies factors contributing to the success of small firms in ATP competitions. It also shows that small firms are adopting effective strategies for success, using ATP funding to accelerate R&D cycles and attract increased private funding, and overcoming the initial hurdles to commercial success and broader diffusion of their technologies. Parallel

analyses are presented for larger firms funded by ATP during the same period for comparative purposes.

10. Henry Etzkowitz and Richard Spivack, *Information Infrastructure for Healthcare: An Evaluation of a Government-Industry Technology Development Initiative*, October 1999, NISTIR 6404. This paper recounts the genesis of the ATP IIH focused program, beginning with the initial exchange of ideas between members of the private and public sector—industry's submission of white papers, workshops conducted by the ATP, meetings held between individuals from both groups—in which those technologies necessary for the development of a national information infrastructure in healthcare were identified. Included is a discussion of the ATP white paper process in which noted differences existed between what the ATP hoped to gain through this method and how the private sector responded. The ATP review and selection process, including the experiences of small, medium and large firms, with ATP projects is also discussed.

11. Mark Ehlen, *Economic Impacts of Flow-Control Machining Technology: Early Applications in the Automobile Industry*, October 1999, NISTIR 6373. This study investigates the impact of two new process technologies developed in the ATP Flow-Control Machining Project: abrasive flow-control machining (FCM) and nontraditional combustion chamber sizing. Under current market conditions, the study reports that automakers will likely use the FCM processes to increase fuel efficiency of their automobiles. The study models a near-term 5-year implementation path for FCM processes, and a 15-year longer-term implementation path, following the historical rate for adoption of fuel injection technology. The study projects an increase in GDP of $142 million per year within the first 5 years of implementation.

12. Rosalie Ruegg, *Advanced Technology Program's Approach to Technology Diffusion*, September 1999, NISTIR 6385. Examining ATP's approach to technology diffusion that puts industry in the lead and emphasizes spillover effects for national economic benefit, this study identifies the key features of the program which promote technology diffusion. It also reports on early progress and discusses challenges that the program faces in achieving intra-industry and inter-industry technology diffusion. It identifies specific strategies pursued by ATP to foster technology diffusion, examines alternative structures of project organization, and provides examples and results.

13. Charles W. Wessner, editor, *The Advanced Technology Program, Challenges and Opportunities*, Board on Science, Technology, and Economic Policy, National Research Council, National Academy Press, September 1999. This volume summarizes a March 1999 symposium conducted by the National Research Council, convened to review the history and rationale of the Advanced Technology Program. This study captures the discussion, proceedings, and papers presented at the conference, including ATP's history and objectives, and its accomplishments. It brings together a broad selection of perspectives on the goals, operations, contributions, and assessment of the ATP to further understanding of the program and the role of government and industry in bringing new technologies to the marketplace.

Appendix 2:
List of ATP Awards for Competition Year 2000

Integrated Communication and Tracking System
Time Domain Corporation
Huntsville, AL

Develop a novel high-performance networking technology based on low-power, ultra-wideband pulse-encoded wireless systems that integrates indoor tracking, telemetry and local-area networking.

Other project participants:

GE Corporate R&D
Niskayuna, NY

Requested ATP funds: $3,296 K
Est. project budget: $6,801 K
Announced: October 2000

Integrated High Gain Glass Fiber Amplifiers and Hybrid Mono-phase Organic-Inorganic Glass-on-Si Photonic Components
NP Photonics, Inc.
Tucson, AZ

Develop inexpensive integrated optical components for advanced communications networks using a new generation of hybrid glass for integration with low-cost amplifiers.

Requested ATP funds: $1,998 K
Est. project budget: $3,346 K
Announced: October 2000

Continuously Extruded Large Core Fiber
Fiberstars, Inc.
Fremont, CA

Develop a continuous manufacturing process to produce a new class of very-large-core optical fibers with properties that today are considered mutually exclusive, creating superior performance and cost features to enable lighting systems that are five times more energy efficient than conventional lighting at one-fifth the operating cost.

Requested ATP funds: $2,000 K
Est. project budget: $3,394 K
Announced: October 2000

Fault Tolerance and Live Upgrades for CORBA and Java Applications
Eternal Systems, Inc.
Goleta, CA

Develop software infrastructure for distributed CORBA or Java applications that will eliminate downtime in the event of a system failure or a system upgrade, allowing companies to create true 24-7 fault-tolerant evolvable systems without requiring special expertise.

Requested ATP funds: $1,957 K
Est. project budget: $2,447 K
Announced: October 2000

Development of a Short Wavelength Pattern Generator

Etec Systems, Inc.
Hayward, CA

Develop new short-wavelength (200 nanometer) laser sources and a compatible photolithography system for creating wafer masks for the next-generation (100 nanometers or less) of semiconductor devices.

Requested ATP funds: $2,000 K
Est. project budget: $5,709 K
Announced: October 2000

Tissue Engineering of an Ischemic Repair Device for Cardiovascular and Other Therapies

Advanced Tissue Sciences, Inc.
La Jolla, CA

Develop implantable devices that combine living cells with a biomaterial "scaffolding" to deliver growth factors that induce growth of new blood vessels leading to wound repair and evascularization of damaged tissues in the heart or other blood-carrying tissues and organs.

Requested ATP funds: $2,000 K
Est. project budget: $3,612 K
Announced: October 2000

Safe, Ultra-High Capacity Li-Ion Polymer Gel Rechargeable Battery

PolyStor Corporation
Livermore, CA

Develop a slim, lightweight, rechargeable, lithium-ion polymer gel battery, with twice the energy capacity of current technology, that does not require costly external safety circuitry in the cell pack.

Requested ATP funds: $2,000 K
Est. project budget: $2,693 K
Announced: October 2000

Novel Internet Enabled Techniques for Diagnosis and Management of Patients with Arthritis

OsteoNet.com, Inc.
Menlo Park, CA

Develop new, more accurate methods for quantitative diagnosis and monitoring of arthritis patients on the basis of automated analysis of magnetic resonance imaging (MRI) data.

Requested ATP funds: $1,900 K
Est. project budget: $2,730 K
Announced: October 2000

Blood "Fingerprinting": A First Step Toward Personalized Medicine

SurroMed, Inc.
Palo Alto, CA

Develop a novel blood-fingerprinting system based on microvolume laser scanning cytometry (MLSC) technology and light-emitting nanocrystals (QDOTTm nanocrystals) for the rapid and comprehensive analysis of whole blood for cell-surface markers, pathogens and biologically important soluble factors.

Other project participants:

Quantum Dot Corporation
Hayward, CA

Requested ATP funds: $5,595 K
Est. project budget: $11,304 K
Announced: October 2000

Fundamental Algorithms for Free Space Photonic Component Design and Tolerancing

Optical Research Associates
Pasadena, CA

Develop novel mathematical algorithms needed for software simulation of the optical behavior of photonics components to improve the design, performance and manufacturability of photonics systems.

Requested ATP funds: $1,123 K
Est. project budget: $2,729 K
Announced: October 2000

Integrated Platform for Implantable Biosensors

GlySens, Inc.
San Diego, CA

Develop a long-term implantable sensor for blood glucose, enabling people with diabetes to better monitor and regulate their blood glucose levels, thus greatly reducing the incidence of severe complications caused by wide blood glucose variations.

Requested ATP funds: $1,685 K
Est. project budget: $1,938 K
Announced: October 2000

Advanced Wafer Inspection for Next-Generation Lithography

KLA-Tencor Corporation
San Jose, CA

Design and demonstrate a path-breaking optical wafer inspection system based on an ultraviolet laser that can detect defects in microcircuits as small as 35 nm while working 18 times faster than existing wafer inspection tools.

Other project participants:

Carnegie-Mellon University
Pittsburgh, PA

Tropel Corporation
Fairport, NY

Requested ATP funds: $6,717 K
Est. project budget: $13,720 K
Announced: October 2000

Deposition Source for Producing Super Lattice, Multilayer Thin Films to Enable Perpendicular Magnetic Recording

Intevac, Inc.
Santa Clara, CA

Develop a high-throughput thin-film deposition source capable of rapidly depositing precisely defined multilayer thin films to enable commercial production of magnetic super lattice films for the next generation of high-capacity disk storage devices.

Requested ATP funds: $1,554 K
Est. project budget: $3,108 K
Announced: October 2000

Advanced Receiver Front-end Technology for 4G Wireless Systems

Conductus, Inc.
Sunnyvale, CA

Design a system of thin-film, high-temperature, superconductor radio-frequency filters and advanced software to meet the need for improved selectivity and adaptability in cellular base stations to cope with the explosive growth of wireless telephone use.

Requested ATP funds: $1,989 K
Est. project budget: $6,975 K
Announced: October 2000

High Reliability, Safe, Rechargeable Lithium Ion Battery and Battery Management System

Quallion, LLC
Valencia, CA

Develop an advanced, long-lasting microminiature battery for implantable medical devices, capable of being recharged from outside of the body with no physical connections, enabling revolutionary treatments for diseases ranging from Parkinson's disease to limbs paralysis.

Other project participants:

Teledyne Electronics Technology
Los Angeles, CA

The Alfred E. Mann Foundation
Valencia, CA

Requested ATP funds: $4,144 K
Est. project budget: $8,457 K
Announced: October 2000

Specific Immune Suppression by Engineered Veto

Biohybrid, Inc.
Denver, CO

Develop a novel technology to prevent the immune system rejection of transplanted tissues by tagging the tissue as well as treating the patient with genetically engineered proteins that inhibit attacks by T cells.

Requested ATP funds: $1,983 K
Est. project budget: $2,201 K
Announced: October 2000

Integrated Planar Solid Oxide Fuel Cell Stack Development

ITN Energy Systems, Inc.
Wheat Ridge, CO

Develop a new generation of low-temperature fuel cells that demonstrate improved efficiency with lower component costs, enabling U.S. industries to compete in a growing global market that could exceed $30 billion.

Requested ATP funds: $1,996 K
Est. project budget: $3,983 K
Announced: October 2000

High-Performance Composite Molecular Sieving Membranes

MEDAL, LP
Newport, DE

Develop composite molecular sieving membranes that will reduce processing costs and improve separation efficiency for natural gas, industrial gases and other applications.

Other project participants:

Chevron Research & Tech. Co.
Richmond, CA

Requested ATP funds: $2,695 K
Est. project budget: $5,401 K
Announced: October 2000

Dual Fuel Catalytic Combustion for Advanced Gas Turbines

Siemens Westinghouse Power Corp.
Orlando, FL

Develop an innovative two-stage catalytic combustion system for gas turbines that can burn gas or liquid fuels, does not require a pre-burner stage, and burns cleanly with very low nitrogen oxide emissions.

Other project participants:

Precision Combustion, Inc.
North Haven, CT

Solar Turbines, Inc.
San Diego, CA

Requested ATP funds: $4,291 K
Est. project budget: $8,757 K
Announced: October 2000

Avian Nuclear Transfer System

AviGenics, Inc.
Athens, GA

Develop novel techniques for nuclear transfer and cloning of birds—chickens in particular—to enable enhanced poultry breeding programs, as a tool for improving or modifying the poultry genome, and potentially to regenerate endangered avian species.

Requested ATP funds: $1,968 K
Est. project budget: $2,531 K
Announced: October 2000

Intelligent Flexible Laser Integration (I-FLI)

Caterpillar, Inc.
Mossville, IL

Develop a new laser, and laser cutting and welding technology, to enable thick-sectioned 3-D structures to be welded with low distortion, using little or no fixturing, for use in agile, flexible manufacturing systems.

Other project participants:

Bender Shipbuilding and Repair Co., Inc.
Mobile, AL

Cutting Edge Optronics, Inc.
St. Charles, MO

GE Corporate R&D
Niskayuna, NY

MTS Systems Corporation
Eden Prairie, MN

Requested ATP funds: $4,621 K
Est. project budget: $9,246 K
Announced: October 2000

Coating-Enabled Component Design/Technology Tools for Nanostructured Coatings

Caterpillar, Inc.
Peoria, IL

Develop improved process-control technologies, models and design tools to enable reliable design of gears and other precision machine components with advanced nanometer-scale coatings for enhanced wear and performance characteristics in heavy equipment.

Other project participants:

J.A. Woollam Co., Inc.
Lincoln, NE

United Technologies Research Center
East Hartford, CT

Requested ATP funds: $4,778 K
Est. project budget: $9,588 K
Announced: October 2000

Printed Organic ASICs: A Disruptive Technology

Motorola, Inc.
Schaumburg, IL

Develop novel organic electronic materials and processing technologies for application-specific integrated circuits (ASICs) to enable the fabrication of large-area electronic devices, such as displays, using relatively inexpensive printing technologies in lieu of semiconductor lithography.

Other project participants:

The Dow Chemical Company
Midland, MI

Xerox
Palo Alto, CA

Requested ATP funds: $7,676 K
Est. project budget: $15,665 K
Announced: October 2000

Single-Site Catalysis: The Next Frontier

Albemarle Corporation
Baton Rouge, LA

Develop new families of well-characterized, highly efficient catalytic activators for use with etallocenes and other single-site catalysts to reduce costs and enable better product control in the production of polyolefin plastics.

Requested ATP funds: $1,989 K
Est. project budget: $4,143 K
Announced: October 2000

High Speed Identification and Sorting of Non-Ferrous Metal Scrap

SpectraMet, LLC
Bedford, MA

Develop a high-speed optoelectronic identification system to rapidly and accurately sort non-ferrous scrap metal for recycling.

Requested ATP funds: $1,997 K
Est. project budget: $2,563 K
Announced: October 2000

Biomaterials for Minimally Invasive Therapies

Curis, Inc.
Cambridge, MA

Develop novel porous synthetic polymer "scaffolds" with the appropriate degradation rates and mechanical properties that can be implanted in patients using minimally invasive surgical procedures to augment, repair or regenerate lost structural tissue or physiological functions.

Requested ATP funds: $2,000 K
Est. project budget: $2,934 K
Announced: October 2000

Intelligent Management of Biochemical Pathways Information

3rd Millennium, Inc.
Cambridge, MA

To develop an information management system for the intelligent organization and analysis of protein interactions and biochemical pathways.

Requested ATP funds: $1,826 K
Est. project budget: $2,329 K
Announced: October 2000

Genetic Modification of Swine for Transplantation Using Nuclear Transfer

BioTransplant, Inc.
Charlestown, MA.

Create genetically modified miniature swine as a potential source of transplantation tissues for humans.

Other project participants:

Advanced Cell Technology
Worcester, MA

Requested ATP funds: $1,676 K
Est. project budget: $3,449 K
Announced: October 2000

Massively Parallel, High-throughput Fluorescence In Situ DNA Sequencing System

Mosaic Technologies
Waltham, MA

Develop a novel high-throughput automated DNA sequencing system for efficient, relatively low-cost, large-scale DNA sequencing, making techniques such as gene expression analysis and polymorphism analysis more affordable in research and medicine.

Requested ATP funds: $2,000 K
Est. project budget: $5,418 K
Announced: October 2000

Advancing the Solar Century -- Ubiquitous Solar Cell Manufacturing

Evergreen Solar, Inc.
Waltham, MA

Develop a desktop-size apparatus and a simple method for making inexpensive photovoltaic cells, realizing a large reduction in the cost of generating solar power and accelerating the widespread use of solar cells.

Requested ATP funds: $2,000 K
Est. project budget: $3,761 K
Announced: October 2000

A Novel Intraoral Three Dimensional Digitizer for Digital Dentistry

Genex Technologies, Inc.
Kensington, MD

Develop a novel, non-contacting, three-dimensional, digital-imaging system to take precise pictures inside the mouth, totally eliminating the need for traditional dental impressions and expensive, time-consuming laboratory procedures for crowns, caps and bridgework.

Requested ATP funds: $1,999 K
Est. project budget: $2,761 K
Announced: October 2000

Advanced High-Capacity Materials for Rechargeable Lithium Batteries

T/J Technologies, Inc.
Ann Arbor, MI

Develop a novel, tin-based anode material to enable a new class of rechargeable lithium batteries with significantly improved performance and reduced cost.

Requested ATP funds: $1,996 K
Est. project budget: $2,800 K
Announced: October 2000

SmartsmithTm: An Imaging-based High-temperature Deformation Process Control System

OG Technologies, Inc.
Ann Arbor, MI

Create the first imaging-based system capable of modeling and controlling the deformation processes of ultrahot metals in forging and rolling, reducing waste by 90 percent, saving billions of dollars and reducing burn injuries in the work force.

Requested ATP funds: $1,995 K
Est. project budget: $3,087 K
Announced: October 2000

Cost-Reduced Magnesium Die Castings Using Heated Runners (CORMAG)

Ford Motor Company
Dearborn, MI

Develop an innovative "hot runner" multiple port injection process for casting large components from magnesium, reducing scrap by at least 10 percent while increasing yields.

Other project participants:

Dynisco Hot Runner System
Gloucester, MA

Intermet Corporation
Troy, MI

North American Die Casting Association
Rosemont, IL

Prince Machine Corp.
Holland, MI

StrikoDynarad
San Leandro, CA

Requested ATP funds: $3,426 K
Est. project budget: $7,094 K
Announced: October 2000

Implantable, Batteryless Microsensor with RF Telemetry for Chronic, Remote Monitoring of Biologic Pressures

Integrated Sensing Systems, Inc.
Ypsilanti, MI

Develop a wireless, batteryless, microfabricated pressure sensor that can be implanted in the body for direct monitoring of intracranial pressure in patients with hydrocephalus and continuous monitoring of intra-ocular pressure for glaucoma therapy.

Requested ATP funds: $1,984 K
Est. project budget: $2,778 K
Announced: October 2000

Independent Life Style Assistant

Honeywell International, Inc.
Minneapolis, MN

Develop an intelligent home automation system with a sophisticated knowledge base, situation awareness and decision-making capability that can be easily integrated with a diverse set of sensors, medical devices and "smart" appliances to enable elderly and infirm users to live and function safely at home.

Requested ATP funds: $1,997 K
Est. project budget: $5,375 K
Announced: October 2000

An Innovative Knowledge System for Rapid Expansion of Net Shape Manufacturing Industry Via Powder Metal Injection Molding

Honeywell Technology Center
Minneapolis, MN

Develop a design and manufacturing process for the economical production of large and complex metal parts through metal injection molding, as well as a knowledge management system to support MIM process design.

Other project participants:

CM Furnaces, Inc.
Bloomfield, NJ

CompAS Controls Inc.
Indiana, PA

Ingersoll Rand Inc.
Huntsville, NC

Pennsylvania State University
University Park, PA

Polymer Technologies, Inc.
Clifton, NJ

Requested ATP funds: $2,796 K
Est. project budget: $5,706 K
Announced: October 2000

Experimental Generation of the First Complete Chemical Reaction Database

ChemCodes, Inc.
Durham, NC

Use high-throughput reaction screening coupled with quantitative mass spectrometry to create the first comprehensive, experimentally derived chemical reactivity database for organic molecules, leading to novel and efficient pathways for synthesizing new compounds.

Requested ATP funds: $2,000 K
Est. project budget: $4,603 K
Announced: October 2000

Reactive Environment, Pulsed Power, Linear Sputtering Source for Large Area Electronics

Energy Photovoltaics, Inc.
Lawrenceville, NJ

Develop a novel sputtering source for efficient, large-area deposition of thin-film materials under difficult conditions—such as a highly reactive environment or temperature-sensitive substrate—for manufacturing applications in solar panels, plasma displays and other areas.

Requested ATP funds: $1,196 K
Est. project budget: $1,425 K
Announced: October 2000

A Performance Prediction Tool for Process Equipment Subject to Localized Corrosion

OLI Systems, Inc.
Morris Plains, NJ

Develop risk-assessment software to evaluate mechanical systems subject to localized corrosion, predict remaining life of equipment, and alert operators to potential corrosion-induced failures, facilitating maintenance, preventing catastrophic accidents, saving U.S. industry billions of dollars and creating thousands of jobs.

Requested ATP funds: $1,984 K
Est. project budget: $3,045 K
Announced: October 2000

Tiled Microdisplay Technology (TMT)

Rainbow Displays, Inc.
Endicott, NY

Develop precision manufacturing techniques and supporting electronics technologies to seamlessly tile silicon microdisplay chips into larger, inexpensive displays for the HDTV market and other high-resolution, high-performance display applications.

Requested ATP funds: $2,000 K
Est. project budget: $4,568 K
Announced: October 2000

Novel Technology for Identification of Tumor Target Antigens

Vaccinex, LP
Rochester, NY

Use rapid screening techniques to identify human tumor-specific antigens for kidney, head and neck cancers and then isolate these antigens for potential diagnostic applications and the associated antibodies for potential cancer therapies.

Requested ATP funds: $2,000 K
Est. project budget: $2,780 K
Announced: October 2000

Advanced Electrolytic System for Combined Oxygen Separation and Compression

Praxair, Inc.
Tonawanda, NY

Develop manufacturing processes and high-pressure components needed for a novel on-site electrolytic system to separate and compress oxygen from air.

Requested ATP funds: $1,982 K
Est. project budget: $6,006 K
Announced: October 2000

Human/Pig Hybrid Livers for Transplantation

Ximerex, Inc.
Omaha, NE

Develop the technology to produce functional hybrid livers—part human, part porcine—in pigs as a potential source of donor organs that can be transplanted to human patients without triggering tissue rejection responses.

Requested ATP funds: $1,999 K
Est. project budget: $2,878 K
Announced: October 2000

Enabling Technologies for Lean Manufacturing of Hardened Steel Applications

Edison Materials Technology Center
Dayton, OH

Develop and refine a revolutionary technique for making a wide range of hardened steel parts, slashing manufacturing costs by up to 30 percent and adding $6 billion to the U.S. economy every year.

Other project participants:

Delphi Automotive Systems
Dayton, OH

Georgia Institute of Technology
Atlanta, GA

Hardinge, Inc.
Elmira, NY

Kennametal
Latrobe, PA

Masco Tech
Royal Oak, MI

Ohio State Unversity
Columbus, OH

Third Wave
Minneapolis, MN

Torrington Company
Norcross, GA

Requested ATP funds: $5,871 K
Est. project budget: $11,747 K
Announced: October 2000

UHMWPE Gel Processing as a New Route for the Production of Lithium-ion Polymer Batteries

AMTEK Research International LLC
Lebanon, OR

Develop materials and a continuous, low-cost, high-speed extrusion process for making trilayer film electrodes and incorporating them into high-performance rechargeable lithium-ion batteries, potentially reducing manufacturing costs by 30 to 40 percent.

Requested ATP funds: $2,000 K
Est. project budget: $4,046 K
Announced: October 2000

Identification of the Hidden Attributes in Legacy Health Care Data

Medical Archival Systems, Inc.
Pittsburgh, PA

Develop an efficient information search and retrieval system for full-text medical records based on parallel processing and modern algorithms and techniques for automatically assessing information relevancy.

Requested ATP funds: $1,768 K
Est. project budget: $3,535 K
Announced: October 2000

Digital Holographic Inspection of Semiconductor Devices

nLine Corporation
Austin, TX

Develop a novel ultraviolet laser-based system to generate high-resolution digital holograms, and high-speed imaging processing and analysis software, for a semiconductor wafer inspection system that can detect small defects at the bottom of tall and narrow features in a production environment.

Other project participants:

InterScience, Inc.
Troy, NY
Light Age, Inc.
Somerset, NJ

PixelVision, Inc.
Beaverton, OR

Requested ATP funds: $9,396 K
Est. project budget: $19,175 K
Announced: October 2000

Intelligent Equipment for Semiconductor Manufacturing

Domain Logix Corporation
Austin, TX

Develop an object-based software architecture that allows semiconductor manufacturing equipment to integrate intelligently with existing or advanced factory automation systems.

Requested ATP funds: $1,452 K
Est. project budget: $1,947 K
Announced: October 2000

Advanced HBT Power Amplifier Technology for Broadband Communications Systems

TriQuint Semiconductor Texas, Inc.
Dallas, TX

Develop advanced, high-performance, low-cost, gallium-arsenide-based heterojunction bipolar transistor power amplifiers and incorporate them in compact multifunction chips for use in next-generation wireless communications and broadband cable systems.

Other project participants:

Epitronics Corporation
Phoenix, AZ

Linear Circuit Innovations, Inc.
Santa Rosa, CA

Requested ATP funds: $3,120 K
Est. project budget: $7,391 K
Announced: October 2000

Flexible Manufacturing Techniques for Large Plastics Molds

Stewart Automotive Research, LLC
Houston, TX

Adapt and optimize water-jet cutting and electron-beam welding to develop a rapid manufacturing process for large plastics molds (typically used in the auto industry) that can halve lead time, improve part quality and lower costs.

Requested ATP funds: $2,000 K
Est. project budget: $2,434 K
Announced: October 2000

Autologous Stem Cell Production

PPL Therapeutics, Inc.
Blacksburg, VA

Develop technology to create the functional equivalent of non-human primate embryonic stem cells without the use of fetal tissue to enable tissue-replacement therapies for a wide range of chronic, degenerative and acute diseases, including diabetes, Parkinson's disease and Multiple Sclerosis.

Requested ATP funds: $1,840 K
Est. project budget: $2,695 K
Announced: October 2000

Multiplexed Gene Switch Technology

RHeoGene, LLC
Charlottesville, VA

Develop a novel gene regulation system allowing quantitative control of the expression of multiple genes within the same cell to study complex biological pathways and processes, with applications in proteomics, functional genomics, gene therapy, toxicology screening, large-scale protein production, and cell-based high-throughput screening assays.

Requested ATP funds: $1,853 K
Est. project budget: $2,727 K
Announced: October 2000

A Novel Molecular Model for Evaluating Cellular Reprogramming

Infigen, Inc.
DeForest, WI

Develop a predictive model in genetically "reprogrammed" and cloned animal embryos to improve the success rate of producing viable transgenic animals from less than 1 percent to near 50 percent.

Requested ATP funds: $1,889 K
Est. project budget: $2,584 K
Announced: October 2000